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Memorandum To: Douglas DeMaster, Director, Alaska Fisheries Science Center  
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Subject: Results of Steller Sea Lion Surveys in Alaska, June-July 2016

Aerial, ship, and land-based surveys to count Steller sea lion (*Eumetopias jubatus*) pups (~1 mo old) and non-pups (adults and juveniles  $\geq 1$  year old) on terrestrial rookery and haul-out sites in Alaska were conducted by the MML in June-July 2016. The manned aerial survey was conducted from 23 June to 11 July from the western Gulf of Alaska ( $158^{\circ}\text{W}$ ) to the Delarof Islands in the central Aleutian Islands ( $179^{\circ}\text{W}$ ). The ship-based survey, which included the use of an unmanned aircraft system (UAS), was conducted from 23 June to 6 July in the Aleutian Islands between  $172^{\circ}\text{E}$  and  $166^{\circ}\text{W}$ . In addition, Steller sea lions were counted from land on Round Island in Bristol Bay by Alaska Department of Fish and Game (ADFG) and on Ugamak Island in the eastern Aleutian Islands by MML.

### Methods

Aerial surveys to count Steller sea lions are conducted in late June through mid-July starting ~10 days after the mean birth dates of pups in the survey area (4-14 June; Pitcher *et al.* 2001). The objectives in 2016 were to survey all terrestrial rookery and haulout sites in the Aleutian Islands and the adjacent western Gulf of Alaska. The boundary between the eastern and western distinct population segments (DPSs) of Steller sea lion is  $144^{\circ}\text{W}$  longitude, and the 2016 survey area was conducted entirely within the area NMFS recognizes as that from which western DPS animals originate.

The NOAA Twin Otter occupied aircraft, equipped with three high-resolution digital cameras (as in 2009-2015; see Fritz *et al.* 2016), surveyed sites from the western Gulf of Alaska to the central Aleutian Islands regions (Delarof Islands, Figure 1). The US Fish and Wildlife Service (USFWS) *R/V Tiġlâx* was used to survey the Aleutian Islands. Counts were conducted by ground observers from a skiff offshore, research vessel, or land-based overlook (mean counts of 2-3 observers are reported), or sea lions were counted from aerial images captured using the UAS (*i.e.*, APH-22 Hexacopter).

Steller sea lions hauled out on Round (Walrus Is.) were counted by field camp observers from an overlook. The mean counts of two observers were averaged over a 5-day period from 27 June to 1 July, when the Twin Otter team surveyed the majority of the eastern Aleutian Island region (personal communication from E. Weiss, Lands and Refuge Manager, Alaska Department of Fish and Game, 333 Raspberry Road, Anchorage, AK 99518). The pup count from Ugamak Bay is the average of two counts by MML field campers conducted on the same day Ugamak Island was surveyed by the Twin Otter team (July 1) since the aerial pup count was incomplete due to fog. Aerial photographs taken with the UAS and Twin Otter system were analyzed as in previous years (see Fritz *et al.* 2016).

*agTrend modeling*—Pup and non-pup count data were modeled using agTrend in order to estimate regional counts and abundance trends from 2003-2016 (Johnson and Fritz 2014). The agTrend model augments missing count information (un-surveyed sites and for years with no survey data) in order to produce estimates of annual total counts and trends for groups of sites within regions and rookery cluster areas (RCAs). Trends were estimated for the 2003-2016 period since 2003 is when the western DPS had its lowest recent estimated non-pup count (Fritz *et al.* 2016). This will be different than previous years' analyses reporting trends dating back to year 2000. For a more direct comparison with trend analysis periods beginning in 2003 and also including current and historical counts in the eastern Bering Sea and northern Bristol Bay, we compare current trends through 2016 to the 2003-2015 period reported in Fritz *et al.* (2016) and refer to it as the '2015 estimate.'

## Results

The Twin Otter-based crew surveyed 147 sites from the western Gulf of Alaska to the central Aleutian Islands regions (Delarof Islands, Figure 1). The Otter team missed 26 sites, which were primarily in the Delarof-Adak Islands region.

The R/V *Tiġlâx* and crew surveyed 39 sites in the Aleutian Islands: 28 were counted by observers from either land-based overlooks, inflatable skiffs offshore, or from the research vessel ("ground"). The UAS was used to survey and photograph 11 sites. Seven sites were missed by the R/V *Tiġlâx* team, however, these sites have historically had no, or few, sea lions present (since the early 2000s).

### *Steller sea lion non-pup counts*

A total of 21,969 live non-pups were counted on 117 sites that had at least one non-pup (Tables 1 and 2). A total of 587 non-pups were counted in the western Aleutian Island region, the only region where no sites were missed.

*agTrend modeling*—For the western DPS in Alaska overall, non-pup counts increased at 2.24%  $y^{-1}$  between 2003 and 2016 (95% credible interval of 1.30-3.24%  $y^{-1}$ ; Table 3 and Figure 2), nearly identical to the 2.25%  $y^{-1}$  estimated for the 2003-2015 period (Fritz *et al.* 2016). The total estimated non-pup count for the western DPS in Alaska in 2016 is 40,672 (35,737-46,305), which is ~1,000 more than the 2015 estimate (39,611; Fritz *et al.* 2016).

The regional pattern of western DPS non-pup count trends is similar to that described in previous years' assessments: generally decreasing counts west of Samalga Pass and increasing counts to the east (Figure 3). West of Samalga Pass, non-pup counts decreased overall at a non-significant rate of -1.42%  $y^{-1}$  between 2003 and 2016, but continued their steep decline in the western Aleutian Islands (-6.71%  $y^{-1}$ ),

though not as steep as estimated through 2015 ( $-8.71\% \text{ y}^{-1}$ ; Fritz *et al.* 2016). This was due to the fact that the total 2016 non-pup count in the western Aleutian Islands was similar or greater than those from 2013 (N=527) and 2014 (N=603), and suggests that abundance may have been stable between 2013 and 2016 in this region. In the central Aleutian Islands, non-pup counts continue to decline ( $-0.73\% \text{ y}^{-1}$ ) though the rate is statistically stable. Within the central Aleutian Islands region, non-pup counts in RCA 2 continue to decline significantly ( $-3.65\% \text{ y}^{-1}$ ), but at a rate slower than the 2015 estimate ( $-4.22\% \text{ y}^{-1}$ ). Moving eastward in the central Aleutians, non-pup counts were statistically stable but declining in RCAs 3 ( $-2.64\% \text{ y}^{-1}$ ) and 4 ( $-1.04\% \text{ y}^{-1}$ ), and stable but increasing in RCA 5 ( $2.13\% \text{ y}^{-1}$ ). East of Samalga Pass, non-pup counts overall increased at  $3.40\% \text{ y}^{-1}$  between 2003 and 2016, down slightly from the 2015 estimate of  $3.51\% \text{ y}^{-1}$  (Fritz *et al.* 2016). This was due to lower estimated rates of increase through 2016 in the eastern Aleutian Islands/Bering Sea (which remained statistically stable at  $1.71\% \text{ y}^{-1}$ ) and the western Gulf of Alaska ( $3.28\% \text{ y}^{-1}$ ), the only regions east of Samalga Pass with 2016 counts.

### *Steller sea lion pup counts*

In 2016, a total of 7,458 live pups were counted by observers or from aerial images on 49 sites that had at least one pup counted within the optimal time window for conducting pup counts (Tables 1 and 2). For the only region surveyed entirely, 199 pups were counted in the western Aleutian Island region.

*agTrend modeling*—For the western DPS in Alaska overall, pup counts increased at  $2.19\% \text{ y}^{-1}$  ( $1.46\text{--}2.90\% \text{ y}^{-1}$ ) between 2003 and 2016 (Table 3 and Figure 4), down slightly from the  $2.26\% \text{ y}^{-1}$  estimated for 2003-2015 (Fritz *et al.* 2016). The total estimated pup count for the western DPS in Alaska in 2016 is 12,631 (11,446-13,927), which is ~230 greater than the 2015 estimate (12,398; Fritz *et al.* 2016).

The regional pattern of western DPS pup count trends is similar to non-pups, with generally decreasing counts west of Samalga Pass and increasing counts to the east (Figure 5). West of Samalga Pass, pup counts decreased overall at  $-1.89\% \text{ y}^{-1}$  between 2003 and 2016, almost identical to the 2015 estimate of  $-1.90\% \text{ y}^{-1}$  (Fritz *et al.* 2016). Steep declines continued in the western Aleutian Islands ( $-6.94\% \text{ y}^{-1}$ ), though slightly less steep than estimated through 2015 ( $-7.61\% \text{ y}^{-1}$ ). As with non-pup counts, a slowing in the estimated rate of decline in pups in the western Aleutian Islands was due to generally stable counts between 2013 (N=203) and 2016. In the central Aleutian Islands, pup counts decreased significantly between 2003 and 2016 in RCAs 2 ( $-3.86\% \text{ y}^{-1}$ ) and 3 ( $-3.07\% \text{ y}^{-1}$ ), while they were statistically stable but decreasing in RCA 4 ( $-0.60\% \text{ y}^{-1}$ ), and stable but increasing in RCA 5 ( $0.97\% \text{ y}^{-1}$ ). East of Samalga Pass, overall pup counts increased at  $3.40\% \text{ y}^{-1}$  between 2003 and 2016. The rate of increase in pup counts in the eastern Aleutian Island/Bering Sea region dropped to just below  $3\% \text{ y}^{-1}$  ( $2.83\% \text{ y}^{-1}$ ) while the three regions and four RCAs to the east maintained a rate of increase  $>3\% \text{ y}^{-1}$ .

### Discussion

Overall, counts of Steller sea lions within the range of the western DPS in Alaska increased at  $\sim 2\% \text{ y}^{-1}$  between 2003 and 2016, a rate that is similar to that estimated through 2015. Differences in count trends east (increasing) and west (generally decreasing) of Samalga Pass in the Aleutian Islands also remain. Trends in the western Aleutians since 2003, though still declining steeply, improved after adding 2016 counts. This was largely due to relatively stable counts since 2013.

## Acknowledgments

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## Literature Cited

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Table 1. Counts of live Steller sea lion non-pups and pups (mean of 2 independent counters) on sites surveyed by the twin Otter aircraft in 2016. See Figure 1 for Region and RCA (rookery cluster area) locations. Rookeries (“Rook”) are noted with a ‘1’ ( $\geq 50$  pups in any year since 1970). Ugamak/Ugamak Bay twin Otter count was incomplete so the mean pup count from MML field camp was used.

Sitename	Region	RCA	Rook	Date	Non-Pup	Pup
ATKINS	W GULF		1	24-Jun	851	347
BIG KONIUJI	W GULF			24-Jun	0	
BIRD	W GULF			24-Jun	153	3
BIRD (SHUMAGINS)	W GULF			24-Jun	110	0
CASTLE ROCK	W GULF			24-Jun	1	
CATON	W GULF			24-Jun	408	2
CHERNABURA	W GULF		1	24-Jun	1047	338
CHERNI	W GULF			24-Jun	0	
CLUBBING ROCKS NORTH	W GULF		1	24-Jun	522	329
CLUBBING ROCKS SOUTH	W GULF		1	24-Jun	714	497
EGG (SAND POINT)	W GULF			24-Jun	0	
HAGUE ROCK	W GULF			24-Jun	0	
HUNT	W GULF			24-Jun	1	
JUDE	W GULF		1	24-Jun	684	344
KUPREANOF POINT	W GULF			24-Jun	296	0
MITROFANIA	W GULF			24-Jun	228	0
NAGAI/MOUNTAIN POINT	W GULF			24-Jun	128	0
NAGAI/RK W OF CAPE WEDGE	W GULF			24-Jun	0	
OLGA ROCKS NE	W GULF			24-Jun	44	0
OLGA ROCKS SW	W GULF			24-Jun	171	6
OMEGA	W GULF			24-Jun	0	
PAUL	W GULF			24-Jun	0	
PINNACLE ROCK	W GULF		1	24-Jun	1150	735
SANAK	W GULF			24-Jun	0	
SEA LION ROCKS (SHUMAGINS)	W GULF			24-Jun	110	0
SIMEONOF	W GULF			24-Jun	2	
SOUTH ROCKS	W GULF		1	24-Jun	394	58
SOZAVARIKA	W GULF			24-Jun	0	
SPITZ	W GULF			24-Jun	0	
SUSHILNOI ROCKS	W GULF		1	24-Jun	456	58
THE HAYSTACKS	W GULF			24-Jun	56	0
THE WHALEBACK	W GULF		1	24-Jun	116	64
TWINS	W GULF			24-Jun	0	
UMGA	W GULF			24-Jun	0	
UNGA/ACHEREDIN POINT	W GULF			24-Jun	126	0
UNGA/CAPE UNGA	W GULF			24-Jun	0	
WOSNESENSKI	W GULF			24-Jun	124	0
ADUGAK	E ALEU		1	3-Jul	584	237

Sitename	Region	RCA	Rook	Date	Non-Pup	Pup
AIKTAK	E ALEU			1-Jul	15	4
AKUN/AKUN BAY	E ALEU			27-Jun	0	
AKUN/AKUN HEAD	E ALEU			27-Jun	0	
AKUN/BILLINGS HEAD	E ALEU		1	27-Jun	755	136
AKUN/JACKASS POINT	E ALEU			1-Jul	0	
AKUTAN/BATTERY POINT	E ALEU			23-Jun	1	
AKUTAN/NORTH HEAD	E ALEU			27-Jun	0	
AKUTAN/REEF-LAVA	E ALEU			27-Jun	218	13
AMAK+ROCKS	E ALEU			27-Jun	1120	2
AVATANAK/NE	E ALEU			1-Jul	15	0
AVATANAK/S	E ALEU			1-Jul	1	0
AVATANAK/SE	E ALEU			1-Jul	53	0
BABY	E ALEU			23-Jun	0	
BASALT ROCK	E ALEU			1-Jul	0	
BOGOSLOF/FIRE ISLAND	E ALEU		1	1-Jul	308	328
EGG	E ALEU			23-Jun	0	
EGG/SE Tip	E ALEU			23-Jun	7	
EGG/West	E ALEU			23-Jun	0	
EMERALD	E ALEU			23-Jun	0	
INNER SIGNAL	E ALEU			23-Jun	12	0
KALIGAGAN	E ALEU			27-Jun	2	
OGCHUL	E ALEU		1	23-Jun	220	130
OLD MAN ROCKS	E ALEU			23-Jun	124	0
OUTER SIGNAL	E ALEU			23-Jun	32	0
POLIVNOI ROCK	E ALEU			23-Jun	110	0
ROCK	E ALEU			24-Jun	0	
ROOTOK/EAST	E ALEU			1-Jul	33	0
ROOTOK/NORTH	E ALEU			1-Jul	12	0
SEA LION ROCK (AMAK)	E ALEU		1	27-Jun	764	243
TANGINAK	E ALEU			1-Jul	32	0
THE PILLARS	E ALEU			23-Jun	6	0
TIGALDA/ROCKS NE	E ALEU			1-Jul	124	0
TIGALDA/SOUTH SIDE	E ALEU			1-Jul	50	0
UGAMAK/NORTH	E ALEU		1	1-Jul	478	509
UGAMAK/ROUND	E ALEU		1	1-Jul	194	138
UGAMAK/SW	E ALEU			1-Jul	1	
UGAMAK/UGAMAK BAY	E ALEU		1	1-Jul	293	234*
UMNAK/AGULIUK POINT	E ALEU			1-Jul	0	
UMNAK/CAPE ASLIK	E ALEU			1-Jul	138	3
UMNAK/CAPE CHAGAK	E ALEU			1-Jul	1	
UMNAK/CAPE IDAK	E ALEU			1-Jul	0	
UMNAK/REINDEER POINT	E ALEU			1-Jul	0	
UNALASKA/BISHOP POINT	E ALEU			1-Jul	140	0
UNALASKA/BRUNDAGE HEAD	E ALEU			23-Jun	0	

Sitename	Region	RCA	Rook	Date	Non-Pup	Pup
UNALASKA/CAPE IZIGAN	E ALEU			23-Jun	292	50
UNALASKA/CAPE SEDANKA	E ALEU			23-Jun	0	
UNALASKA/CAPE STARICHKOF	E ALEU			1-Jul	0	
UNALASKA/CAPE WISLOW	E ALEU			23-Jun	0	
UNALASKA/KOVRIZHKA	E ALEU			1-Jul	0	
UNALASKA/MAKUSHIN BAY	E ALEU			1-Jul	142	0
UNALASKA/PRIEST ROCK	E ALEU			23-Jun	7	0
UNALASKA/SPRAY CAPE	E ALEU			1-Jul	68	0
UNALASKA/WHALEBONE CAPE	E ALEU			23-Jun	2	
UNIMAK/CAPE LAZAREF	E ALEU			24-Jun	201	0
UNIMAK/CAPE LUTKE	E ALEU			24-Jun	0	
UNIMAK/CAPE SARICHEF	E ALEU			1-Jul	26	0
UNIMAK/CAVE POINT	E ALEU			27-Jun	0	
UNIMAK/OKSENOF POINT	E ALEU			27-Jun	358	0
UNIMAK/SCOTCH CAP	E ALEU			27-Jun	0	
UNIMAK/SENNETT POINT	E ALEU			27-Jun	0	
VSEVIDOF	E ALEU			23-Jun	118	1
ADAK/ARGONNE POINT	C ALEU	4		7-Jul	0	
ADAK/CAPE MOFFET	C ALEU	4		7-Jul	13	0
ADAK/HEAD ROCK	C ALEU	4		3-Jul	0	
AGLIGADAK	C ALEU	5		4-Jul	36	0
AMLIA/EAST CAPE	C ALEU	5		4-Jul	420	96
AMLIA/SVIECH. HARBOR	C ALEU	5		4-Jul	162	39
AMTAGIS	C ALEU	5		4-Jul	0	
AMUKTA+ROCKS	C ALEU	5		11-Jul	38	0
ANAGAKSIK	C ALEU	4		4-Jul	2	0
ATKA/CAPE KOROVIN	C ALEU	4		4-Jul	0	
ATKA/NORTH CAPE	C ALEU	4		4-Jul	152	0
BOBROF	C ALEU	3		9-Jul	0	
CHUGINADAK	C ALEU	4		3-Jul	74	2
CHUGUL	C ALEU	4		4-Jul	30	2
FENIMORE	C ALEU	4		4-Jul	117	0
GARELOI	C ALEU	3		9-Jul	0	
GREAT SITKIN	C ALEU	4		4-Jul	0	
HERBERT	C ALEU	5		3-Jul	130	0
IGITKIN/SW POINT	C ALEU	4		4-Jul	0	
IKIGINAK	C ALEU	4		4-Jul	9	0
KAGALASKA	C ALEU	4		4-Jul	1	
KANAGA/CAPE MIGA	C ALEU	3		7-Jul	0	
KANAGA/N CAPE	C ALEU	3		7-Jul	0	
KANAGA/SHIP ROCK	C ALEU	3	1	9-Jul	270	190
KASATOCHI/NORTH POINT	C ALEU	4	1	4-Jul	602	432
KONIUJI/NORTH POINT	C ALEU	4		4-Jul	0	
LITTLE TANAGA STRAIT	C ALEU	4		4-Jul	91	0

Sitename	Region	RCA	Rook	Date	Non-Pup	Pup
OGLODAK	C ALEU	4		4-Jul	45	0
SAGCHUDAK	C ALEU	4		4-Jul	0	
SAGIGIK	C ALEU	5		4-Jul	26	0
SALT	C ALEU	4		4-Jul	0	
SEGUAM/FINCH POINT	C ALEU	5		4-Jul	276	11
SEGUAM/LAVA COVE	C ALEU	5		4-Jul	0	
SEGUAM/LAVA POINT	C ALEU	5		4-Jul	0	
SEGUAM/MOUNDHILL POINT	C ALEU	5		4-Jul	52	0
SEGUAM/SADDLERIDGE	C ALEU	5	1	4-Jul	928	568
SEGUAM/SW RIP	C ALEU	5		4-Jul	13	0
SEGUAM/TURF POINT	C ALEU	5		4-Jul	55	0
SEGUAM/WHARF POINT	C ALEU	5		4-Jul	0	
SILAK	C ALEU	4		4-Jul	24	1
TAGALAK	C ALEU	4		4-Jul	118	2
TAGALAK/PASS	C ALEU	4		4-Jul	209	9
TANADAK (AMLIA)	C ALEU	5		4-Jul	31	0
TANAGA/BUMPY POINT	C ALEU	3		7-Jul	14	0
TANAGA/CAPE SAJAKA	C ALEU	3		7-Jul	0	
TANAGA/CAPE SUDAK	C ALEU	3		9-Jul	99	0
ULIAGA	C ALEU	4		3-Jul	178	0
YUNASKA	C ALEU	5	1	3-Jul	358	159

*\*UGAMAK/UGAMAK BAY 234 pup count is a mean count of two counts from the MML field camp. The twin Otter pup count of 220 was incomplete due to fog.*

Table 2. Counts of live Steller sea lion non-pups and pups on sites surveyed during 2016 ship- and ground-based efforts. Counts conducted from cliff tops, inflatable skiffs offshore, or from the research vessel are indicated as a “ground” source and sites surveyed with the unmanned aircraft are labeled “UAS”, Rookeries (“Rook”) are noted with a ‘1’ ( $\geq 50$  pups in any year since 1970).

Sitename	Region	RCA	Rook	Date	Mode	Non-Pup	Pup
AKUTAN/CAPE MORGAN	E ALEU		1	6-Jul	UAS	900	730
UGAMAK/UGAMAK BAY	E ALEU		1	1-Jul	GROUND		234
ROUND (WALRUS IS)+	E ALEU (BERING)			Mean	GROUND	285	0
AMCHITKA/BIRD	C ALEU	2		1-Jul	GROUND	8	0
AMCHITKA/CAPE IVAKIN	C ALEU	2		2-Jul	GROUND	0	0
AMCHITKA/COLUMN ROCK	C ALEU	2	1	1-Jul	UAS	64	35
AMCHITKA/EAST CAPE	C ALEU	2		2-Jul	UAS	112	13
AMCHITKA/OMEGA POINT	C ALEU	2		2-Jul	GROUND	0	0
AMCHITKA/ST. MAKARIUS	C ALEU	2		2-Jul	GROUND	0	0
AYUGADAK	C ALEU	2	1	25-Jun	GROUND	103	40
HAWADAX (RAT)	C ALEU	2		25-Jun	GROUND	0	0
KISKA/CAPE ST STEPHEN	C ALEU	2	1	26-Jun	UAS	156	40
KISKA/GERTRUDE-BUKHTI	C ALEU	2		26-Jun	GROUND	10	0
KISKA/LIEF COVE	C ALEU	2	1	26-Jun	UAS	150	78
KISKA/SOBAKA-VEGA	C ALEU	2		26-Jun	GROUND	24	0
KISKA/SOUTH HEAD	C ALEU	2		25-Jun	GROUND	0	0
LITTLE SITKIN	C ALEU	2		25-Jun	GROUND	0	0
SEA LION ROCK (KISKA)	C ALEU	2		25-Jun	GROUND	0	0
SEGULA/CHUGUL POINT	C ALEU	2		25-Jun	GROUND	0	0
SEGULA/GULA POINT	C ALEU	2		25-Jun	GROUND	0	0
SEMISOPOCHNOI/PETREL	C ALEU	2		24-Jun	GROUND	17	0
SEMISOPOCHNOI/POCHNOI	C ALEU	2		24-Jun	UAS	36	3
SEMISOPOCHNOI/SW KNOB	C ALEU	2		24-Jun	GROUND	0	0
SEMISOPOCHNOI/TUMAN POINT	C ALEU	2		24-Jun	GROUND	0	0
TANADAK (KISKA)	C ALEU	2		25-Jun	GROUND	0	0
TWIN ROCKS (KISKA)	C ALEU	2		25-Jun	GROUND	2	0
AGATTU/CAPE SABAK	W ALEU		1	30-Jun	UAS	116	42
AGATTU/GILLON POINT	W ALEU		1	30-Jun	UAS	174	100
AGATTU/KOHL ISLAND	W ALEU		1	30-Jun	GROUND	3	0
AL Aid	W ALEU			28-Jun	UAS	66	14
ATTU/CAPE WRANGELL	W ALEU		1	29-Jun	UAS	132	42
ATTU/CHICHAGOF POINT	W ALEU			28-Jun	UAS	68	0
ATTU/CHIRIKOF POINT	W ALEU			28-Jun	GROUND	0	0
ATTU/KRESTA POINT	W ALEU			29-Jun	GROUND	0	0
BULDIR/EAST CAPE	W ALEU			27-Jun	GROUND	21	0
BULDIR/NW ROCKS	W ALEU		1	27-Jun	GROUND	7	1
BULDIR/ROOKERY	W ALEU		1	27-Jun	GROUND	0	0
INGENSTREM ROCKS	W ALEU			27-Jun	GROUND	0	0

Sitename	Region	RCA	Rook	Date	Mode	Non-Pup	Pup
NIZKI	W ALEU			28-Jun	GROUND	0	0
SHEMYA	W ALEU			28-Jun	GROUND	0	0

*+ROUND (WALRUS IS) counts were provided by ADFG and are a mean of single daily counts on 27 June through 1 July.*

Table 3. Annual rates of change (%  $y^{-1}$  with  $\pm$  95% credible intervals) in counts of Steller sea lion pups and non-pups from west to east in the western DPS (U.S.), for the period 2003-2016 modeled using agTrend.

	Non-Pup			Pup		
	Rate	-95% CI	+95% CI	Rate	-95% CI	+95% CI
W ALEU	-6.71	-8.46	-5.08	-6.94	-8.19	-5.75
C ALEU	-0.73	-2.48	1.12	-1.33	-2.58	0.03
RCA 2	-3.65	-6.39	-0.94	-3.86	-6.36	-1.23
RCA 3	-2.68	-5.40	0.05	-3.07	-4.76	-1.28
RCA 4	-1.04	-3.47	1.37	-0.60	-2.05	1.21
RCA 5	2.13	-2.02	6.36	0.97	-2.28	4.73
W of Samalga Pass	-1.42	-2.99	0.27	-1.89	-2.99	-0.63
E ALEU	1.71	-0.26	3.67	2.83	1.60	4.04
W GULF	3.28	1.19	5.11	3.70	1.92	5.31
C GULF	4.33	2.45	6.16	4.22	2.35	6.29
E GULF	5.36	1.74	9.11	4.61	2.33	6.83
E of Samalga Pass	3.40	2.29	4.67	3.71	2.80	4.59
All wDPS (US)	2.24	1.30	3.24	2.19	1.46	2.90

Figure 1. Steller sea lion terrestrial rookeries and haulouts surveyed in June-July 2016. Survey regions, rookery cluster areas (RCAs) and boundary of the eastern and western distinct population segments (DPSs) in Alaska are also shown.

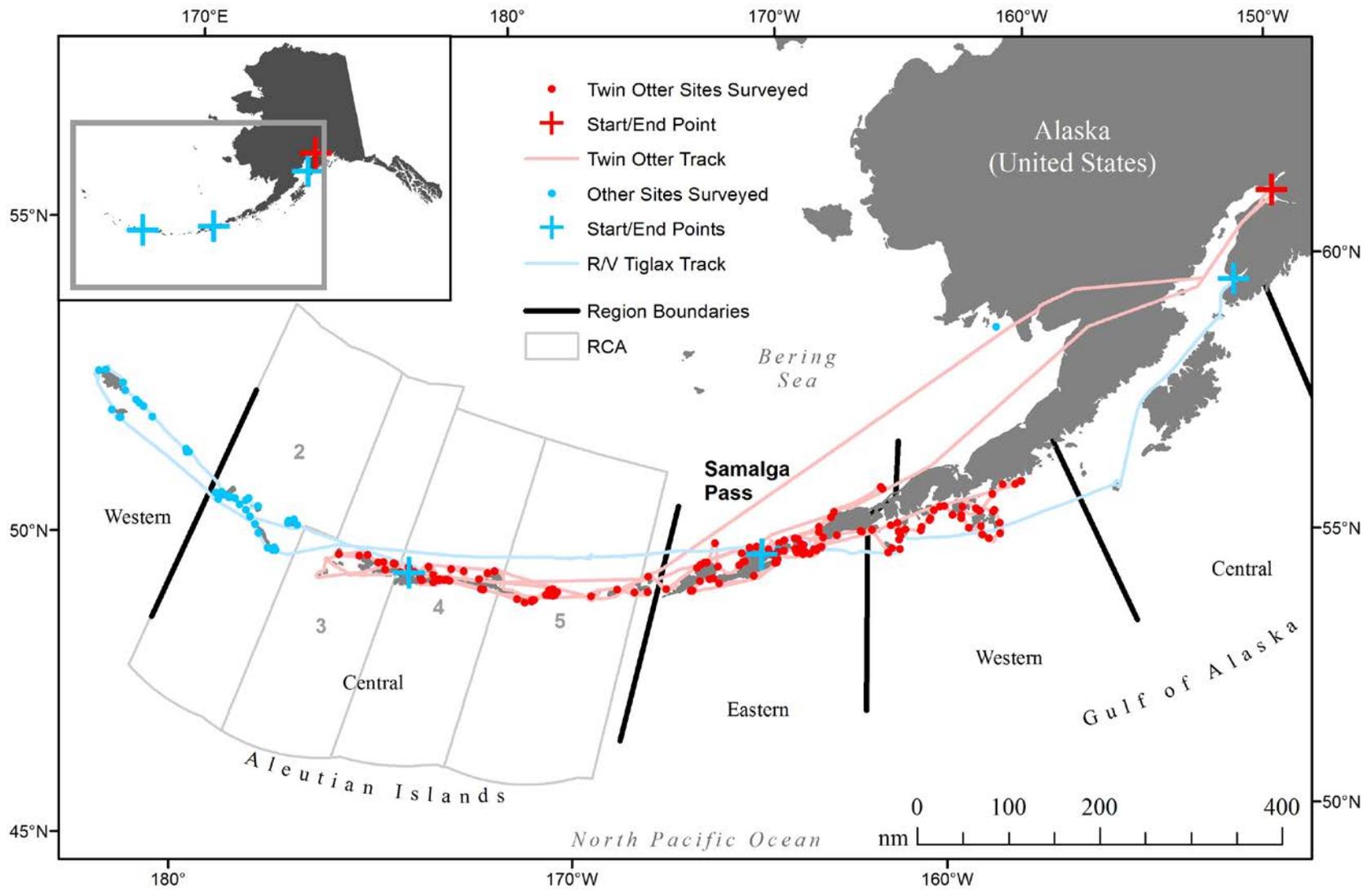


Figure 2. Realized and predicted counts of western Steller sea lion non-pups in Alaska, 2003-2016. Realized counts are represented by points and vertical lines (95% credible intervals). Predicted counts are represented by the black line surrounded by the gray 95% credible interval.

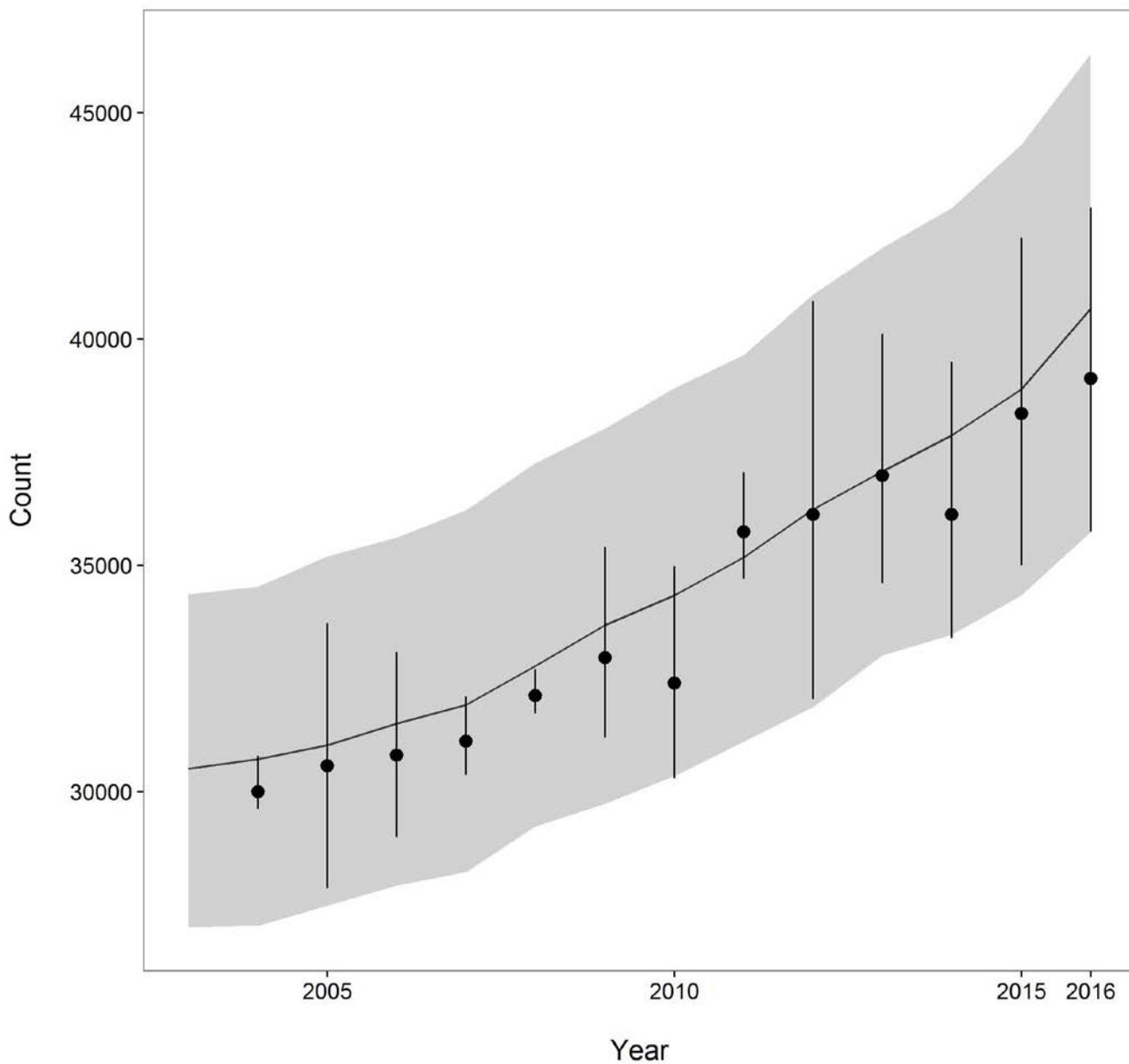


Figure 3. Realized and predicted counts of western Steller sea lion non-pups in Alaska west and east of Samalga Pass (~170°W in the Aleutian Islands), 2003-2016. Realized counts are represented by points and vertical lines (95% credible intervals). Predicted counts are represented by the black line surrounded by the gray 95% credible interval.

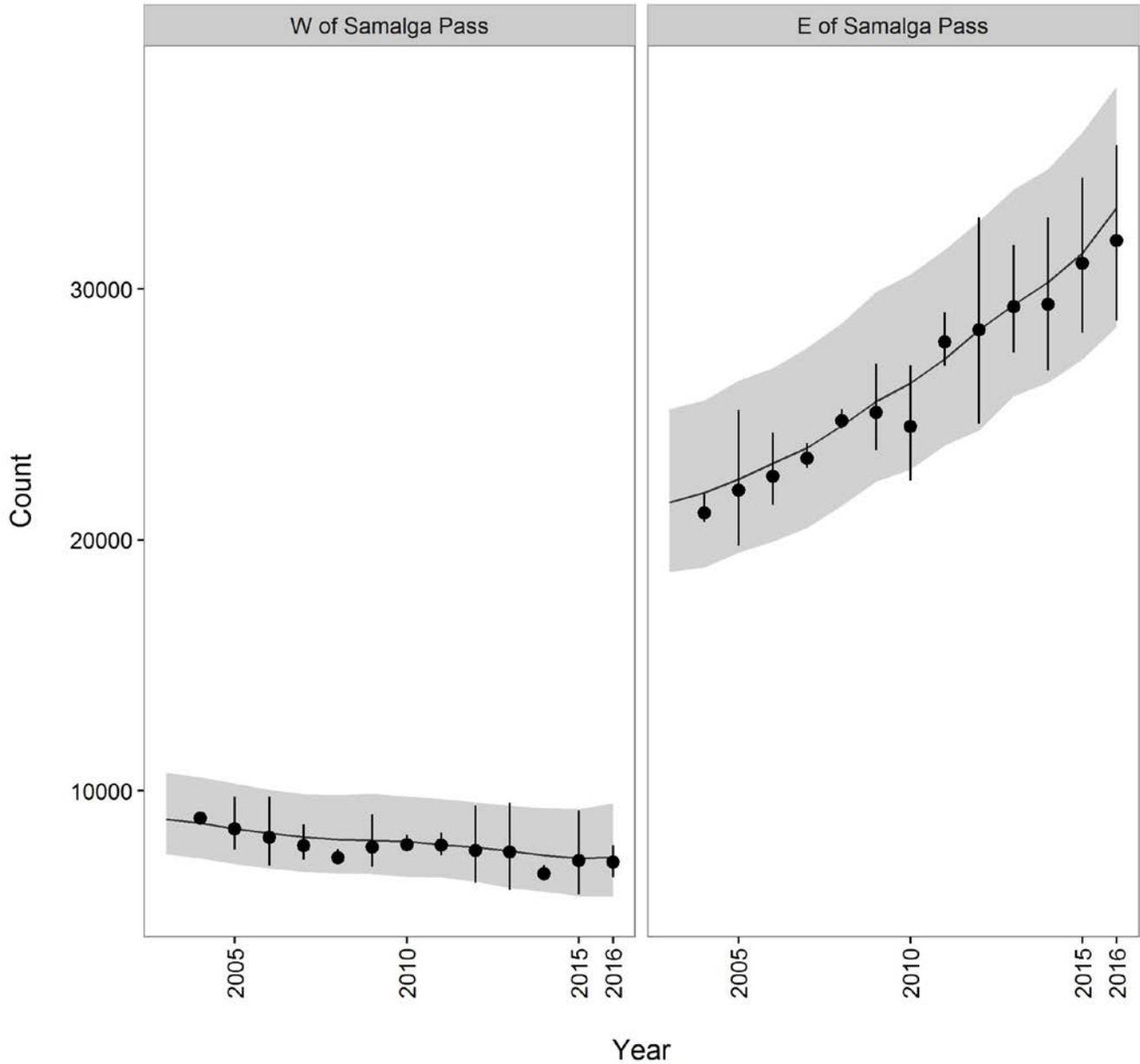


Figure 4. Realized and predicted counts of western Steller sea lion pups in Alaska, 2003-2016. Realized counts are represented by points and vertical lines (95% credible intervals). Predicted counts are represented by the black line surrounded by the gray 95% credible interval.

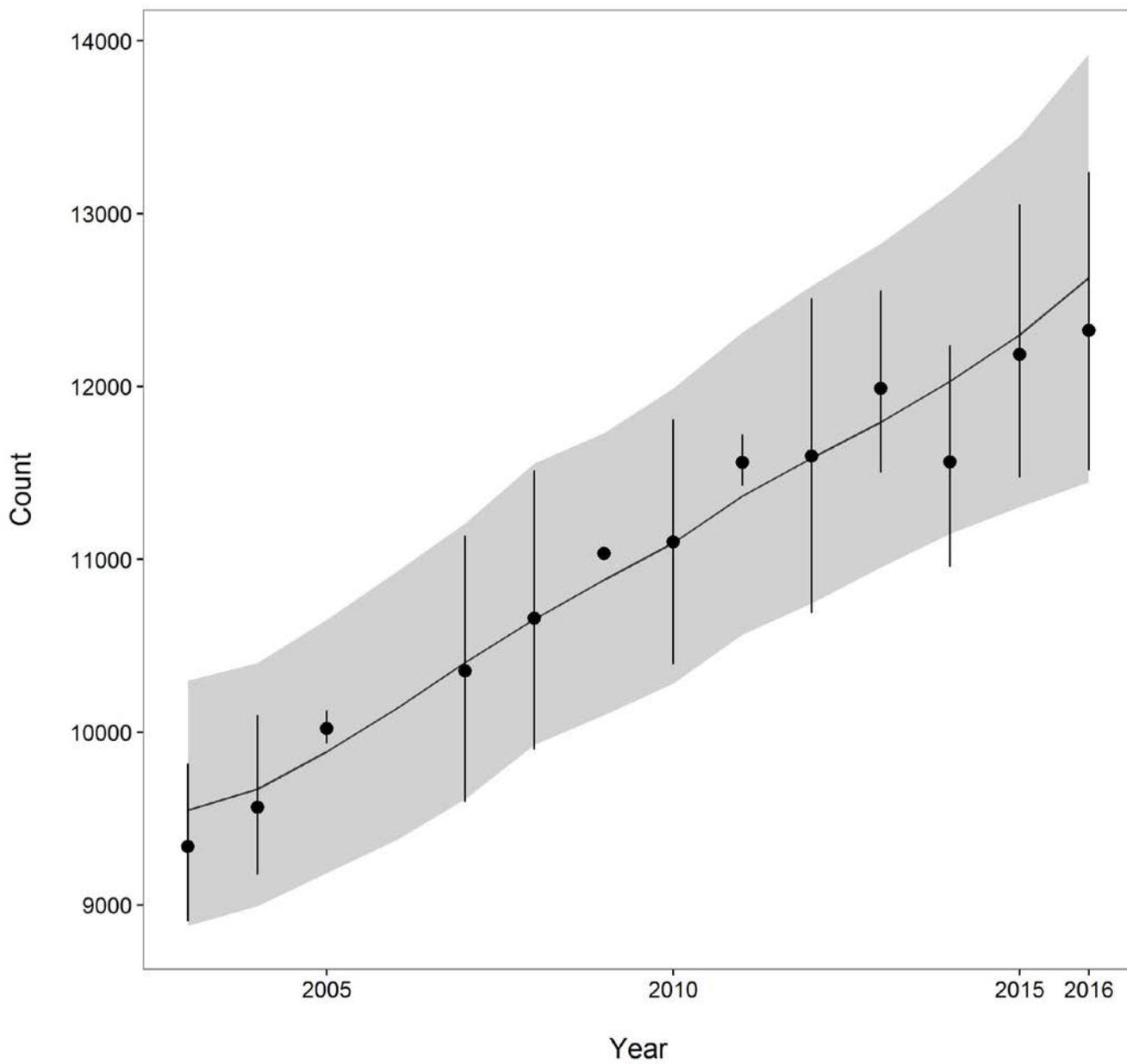


Figure 5. Realized and predicted counts of western Steller sea lion pups in Alaska west and east of Samalga Pass (~170°W in the Aleutian Islands), 2003-2016. Realized counts are represented by points and vertical lines (95% credible intervals). Predicted counts are represented by the black line surrounded by the gray 95% credible interval.

